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Assistant Commissioner for Patents
Washington, District of Columbia 20231

To the Assistant Commissioner for Patents:

Please file the following enclosed patent application papers:

Applicants' Names: Dennis L. Ford, Michael R. Leggett and Cindy Leggett-Ford

Title: APPARATUS AND METHOD FOR MUSIC PRODUCTION BY AT LEAST TWO REMOTELY
LOCATED MUSICIANS

- ✓ Specification, Claims, and Abstract: No. of Pages: Eighteen
- ✓ Formal Drawing(s): One Formal sheets enclosed
- ✓ Declaration: Date Signed: March 7, 2000
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- ✓ Information Disclosure Statement
- ✓ Form PTO/SB/08A
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- ✓ Return Receipt Postcard Addressed to Agent

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PATENT TRADEMARK OFFICE

Respectfully submitted,

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Signed: *Janice R. Kull*

APPLICATION

Of

DENNIS L. FORD

MICHAEL R. LEGGETT

And

CINDY LEGGETT-FORD

For

UNITED STATES LETTERS PATENT

On

Apparatus And Method For Music Production By At Least Two Remotely Located Musicians

Sheets of Drawings: One

TITLE: Apparatus And Method For Music Production By At Least Two Remotely Located Musicians

A previously filed provisional patent application having serial number 60/114,180 and an assigned filing date of 12/30/98 and which contains subject matter similar in concept to that described and claimed in the present application is herein identified.

BACKGROUND OF THE INVENTION

10 FIELD OF THE INVENTION:

This invention relates generally to an apparatus and method for music production by at least two remotely located musicians, and more particularly to a stereo telephone device providing an interactive audio mixing board and expandable bandwidth.

15 DESCRIPTION OF RELATED ART:

The following art defines the present state of this field:

20 Brotz et al. US 5,398,278 describes a telephone interface system to interconnect the output of two or more musicians, one at an instant location and the other at a remote location, over communication lines, such system converting the analog musical output to digital form for duplexing over the communication lines.

25 Nakano, et al. US 5,182,768 describes a digital telephone set connected to a digital data exchange through a transmission line. A plurality of handsets, which are mounted on a telephone body, are for converting input sounds into input analog speech signals and for converting output analog speech signals into output sounds. Connected to the handsets, a plurality of analog-to-digital converters converts the input analog speech signals into input

digital speech signals. Connected to the handsets, a plurality of digital-to-analog converters converts output digital speech signals into the output analog speech signals. On the telephone body are mounted a set of dialing keys for producing a numerical signal. Connected to the dialing keys, a control device is for producing input control data in response to the numerical signal and is for producing an output control signal in response to output control data. Connected to the transmission line, the control device, the analog-to-digital converters, and the digital-to-analog converters, a multiplexing/demultiplexing circuit is for transmitting/receiving transmission/reception time division multiplexed signals to/from the digital data exchange through the transmission line. The multiplexing/demultiplexing circuit is for multiplexing the input digital speech signals and the input control data into the transmission time division multiplexed signal and for demultiplexing the reception time division multiplexed signal into the output digital speech signals and the output control data.

Brotz , et al. US 5,020,101 describes a musician's telephone interface that interconnects an instant location through a telephone line to a remote location such device having inputs to receive the sound from musical instruments and/or vocalization at each location with balancing circuitry and broadcast means at each location for the musicians at each location to hear the music of one another simultaneously balanced for collaboration and production of music.

Hoque, et al. US 4,922,536 describes in-studio, stage or field applications, high fidelity audio signals are transmitted to a remote processor in digital form in order to solve the problems of audio degradation, cross talk, ground loops and multi-cable problems associated with the analog transmission of multiple channels of audio over long distances. In one embodiment a TDM/FDM multiplexing system is utilized with increased bandwidth and dynamic range compared to data and telephone multiplexing systems to accommodate high fidelity requirements. In an embodiment involving a distributed system, multiple MUX and DEMUX modules are coupled in a distributive fashion along a light-weight transmission

line, in which each of the modules is assigned a predetermined transmission frequency and with each of the modules having a number of audio inputs which are time-multiplexed for that particular MUX module and frequency. The Subject System precludes the necessity of running multiple audio cables to remote destinations, while at the same time providing an exceptionally quiet system, since the digital data stream is extremely tolerant to cross talk, ground loops, noise, signal attenuation, and non-linearity associated with conventional analog audio transmission.

The prior art teaches various apparatuses which convert analog signals to digital and the reverse, as well as allowing multiplexing over phone lines. The prior art also teaches a multiplexing system with increased bandwidth and dynamic range, where a transmission occurs over lightweight coaxial cable, or fiberoptic or twisted-pair cable . However, the prior art does not teach an invention and method that allows transmission of signals between local and remote musicians where the transmission occurs over standard phone lines with a bandwidth of up to 20 kHz, which is nearly seven times that enabled by prior art technology. The present invention fulfills these needs and provides further related advantages as described in the following summary.

SUMMARY OF THE INVENTION

The present invention teaches certain benefits in construction and use which give rise to the objectives described below. A local and remote sites are joined by one or two telephone lines so that both monaural as well as stereo signals may be transmitted between the two sites and combined by adjusting level and delay to synch the signals as if produced at either site. The upper and lower frequencies that are not easily passed by copper telephone transmission lines are adjusted in frequency and multiplexed for transmission.

The remote site is constructed similarly to the local site so that the signal of remote origin is transmitted to the local site in the same manner. The remote signal is transmitted over the same phone line if it is duplexed, or over a separate phone line for improved signal integrity, better separation and improved fidelity, i.e., signal carrying capacity.

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The remote origin signal is received by a local demultiplexer circuit which establishes the three signals representing the low, mid and high range of the remote sourced signal. The mid range portion is directed to the local mixer circuit while the low range portion is demodulated and the high range portion is frequency multiplied by an order of magnitude in the reverse processes as described above. The remote low and high pass portions are directed to the mixer circuit. The mixer circuit combines all three of the remote signal portions and adjusts their level or volume as well as establishing a time delay in the local signal so that both the local signal and the remote signal are in time synch. The local and the remote sourced signal are then directed to a monitor such as a video screen or to a loudspeaker.

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The same signal processing is conducted at the remote site so that the remote musician(s) are able to enjoy the local music portion and maintain synchronization.

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In a first embodiment, the local signal is transmitted on the first phone line while the remote signal is transmitted on the second phone line. In a second embodiment of the present invention, the left channel of a stereo local and remote signals are transmitted over the first phone line while the right channel is transmitted over the second phone line. In a third embodiment, portions of both local and remotely derived signals are sent over one phone line which the complementary portions of the signals are transmitted over the other phone line. For example, the low pass of the local signal and the mid and high pass of the remote signal may be transmitted over the first line, while the mid and high pass of the local signal and the low pass of the remote signal is transmitted over the second line.

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While the invention has been described with reference to at least one preferred embodiment, it is to be clearly understood by those skilled in the art that the invention is not limited thereto. Rather, the scope of the invention is to be interpreted only in conjunction with the appended claims.

A primary objective of the present invention is to provide an apparatus and method for music production by at least two remotely located musicians having advantages not taught by the prior art.

- 5 Another objective is to provide such a device and method of use able to be utilized by musicians using conventional phone lines..

- A further objective is to provide such an apparatus and method of use which allows a signal of up to 20 kHz bandwidth -- nearly seven times more than the current state of the art -- to be
10 conveyed over two phone lines.

A still further objective is to provide such an apparatus and method of use that allows conference calling capabilities between local and remote musicians at two or more locations.

- 15 A still further objective is to provide such an apparatus and method of use that provides for signal delay control, so as to provide synchronization in time between the output and input signals. The signal passes out to the remotely located musician(s) who are able to hear it contemporaneously with its being produced, despite the time difference that may exist between the local musicians and the remotely located musicians.

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Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

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BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawing illustrates the present invention wherein FIGURE 1 is a schematic diagram of a local site of the preferred embodiment of the present invention, wherein a remote site is constructed identically.

DETAILED DESCRIPTION OF THE INVENTION

The above described drawing figure illustrates the invention, an apparatus for music production by at least one local and at least one remotely located musician so that they can produce a jointly and combined music signal which seems to come from a common source although the local and remote musicians may be separated by a large distance. A local music signal is produced by one or more local musicians or music sources of any kind and conducted for processing to a local signal mixing element as is well known. At the same time, a telephone line transmits a midrange frequency portion of the local music signal to a remote location. The midrange portion of the signal is considered to have a bandpass of 300 to 3,000 Hz which a standard copper phone line will pass without attenuation. However, the low pass range: 20 Hz to 300 Hz, and the high pass range: 3,000 Hz to 20,000 Hz of the music signal are greatly attenuated by the standard phone line so that these portions of the signal are not transmitted directly. Music is considered to present full fidelity if all frequencies from 20 Hz to 20,000 Hz are present at full amplitude.

It is desired to send the low and high bands to the remote site over the phone line along with the midrange, and without attenuation.

As shown in Fig. 1 the low and high portions of the local signal are selected by low and high bandpass filters respectively. The low pass portion of the signal is frequency shifted by a standard frequency shifting circuit (modulator) as is well known to those of skill in the art, to a range of from 2,250 Hz to 3,000 Hz. The high pass portion of the signal is frequency divided by an order of magnitude to a range of from 300 Hz to 2,000 Hz. The low, mid and high ranges of the signal are then multiplexed and transmitted on a first phone line.

If the signals are split into left and right stereo portions, they are treated in the same manner over two channels simultaneously.

CLAIMS

What is claimed is:

- 5 1. An apparatus for music production by a local and at least one remotely located musicians
the apparatus comprising:

a local music signal produced by a local music source and conducted for processing:

- 10 a) to a local music monitor;
- b) to a multiplexing means and a first telephone line for transmitting a midrange
frequency portion of the local music signal to a remote location; and
- c) in sequence, to an output low bandpass filtering means, a modulator and
frequency shifting means and frequency shifting means, the multiplexing
means, and the first telephone line for transmitting a low frequency portion of
the local music signal to a remote location; and
- 15 d) in sequence, to a demultiplexing means, an output high bandpass filtering
means, a frequency dividing means, the multiplexing means and the first
telephone line for transmitting a high frequency portion of the local music
signal to the remote location;

20 a remote music signal produced by a remote music source and conducted for processing
through s second telephone line and further:

- a) to the local music monitor for receiving a midrange portion of the remote
music signal;
- b) in sequence, to an input low bandpass filtering means, a demodulator and
frequency shifting means, and a modulator and frequency shifting means and
thence to the local music monitor;
- 25 c) in sequence, to an input high bandpass filtering means, a frequency
multiplying means and thence to the local music monitor;

such that the local music signal and the remote music signal are combined to form a combined music signal.

2. The apparatus of claim 1 further providing a means for signal level control so as to provide identical levels in the output and input signals.

3. The apparatus of claim 1 further providing a means for signal delay control so as to provide synchronization between the output and input signals.

4. An apparatus for music production by a local and at least one remotely located musician, the apparatus comprising:

a local music stereo signal having a left and a right channel stereo portions produced by a local music source and conducted for processing of the left channel portion of the stereo signal:

c) to a local music monitor;

d) to a multiplexing means and a first telephone line for transmitting a midrange frequency left channel portion of the local music signal to a remote location;

e) in sequence, to an output low bandpass filtering means, a modulator and frequency shifting means and frequency shifting means, the multiplexing means, and the first telephone line for transmitting a low range frequency left channel portion of the local music signal to the remote location; and

f) in sequence, to an output high bandpass filtering means, a frequency dividing means, the multiplexing means and the first telephone line for transmitting a high range frequency portion of the local music signal to the remote location;

and conducted for processing of the right channel portion of the stereo signal:

a) to the local music monitor;

b) to the multiplexing means and the first telephone line for transmitting a midrange frequency right channel portion of the local music signal to the remote location using the first telephone line;

c) in sequence, to the output low bandpass filtering means, the modulator and frequency shifting means and frequency shifting means, the multiplexing means, and the first telephone line for transmitting a low frequency right channel portion of the local music signal to the remote location; and

5 d) in sequence, to an output high bandpass filtering means, a frequency dividing means, the multiplexing means and the first telephone line for transmitting a high frequency right channel portion of the local music signal to the remote location; and

10 a remote music stereo signal having a left and a right channel stereo portions produced by a remote music source and conducted for processing of a left channel portion of the remote stereo signal:

a) from a second telephone line, to a de-multiplexing means for receiving a midrange frequency left channel portion of the remote music signal from the remote location and therefrom to the local music monitor;

15 b) in sequence, from the second telephone line, to a de-multiplexing means, an input low bandpass filtering means, an input demodulating means, an input frequency shifting means, and the local music monitor; and

20 c) in sequence, from the second telephone line, to the de-multiplexing means, an input high bandpass filtering means, a frequency multiplying means, and the local music monitor;

and conducted for processing of the right channel portion of the remote stereo signal:

d) from a second telephone line, to a de-multiplexing means for receiving a midrange frequency right channel portion of the remote music signal from the remote location and therefrom to the local music monitor;

25 e) in sequence, from the second telephone line, to the de-multiplexing means, the input low bandpass filtering means, the input demodulating means, the input frequency shifting means, and the local music monitor; and

- f) in sequence, from the second telephone line, to the de-multiplexing means, an input high bandpass filtering means, a frequency multiplying means, and the local music monitor;

such that the remote and local stereo signals are merged for output to the local music monitor.

- 5 5. The apparatus of claim 5 further providing a means for signal level control so as to provide identical levels in the output and input signals.

- 10 6. The apparatus of claim 5 further providing a means for signal delay control so as to provide synchronization between the output and input signals.

- 7. An apparatus for music production by a local and at least one remotely located musician, the apparatus comprising:

a local music stereo signal having a left and a right channel stereo portions produced by a local music source and conducted for processing of the left and right channel portions of the stereo signal:

- 15 a) to a local music monitor;
- b) to a multiplexing means for transmitting a midrange frequency left and right channel portions of the local music signal to a remote location using a first telephone line;
- 20 c) in sequence, to an output low bandpass filtering means, a modulator and frequency shifting means and frequency shifting means, the multiplexing means, and the first telephone line for transmitting a low frequency left and right channel portions of the local music signal to the remote location; and
- 25 d) in sequence, to an output high bandpass filtering means, a frequency dividing means, the multiplexing means and the first telephone line for transmitting a high frequency left and right portions of the local music signal to the remote location;

a remote music stereo signal having a left and a right channel stereo portions produced by a remote music source and conducted for processing of left and right channel portions of the remote stereo signal:

- a) from a second telephone line, to a de-multiplexing means for receiving a midrange frequency left and right channel portions of the remote music signal from the remote location and therefrom to the local music monitor;
- b) in sequence, from the second telephone line, to a de-multiplexing means, an input low bandpass filtering means, an input demodulating means, an input frequency shifting means for a low range left and right stereo portions to the local music monitor; and
- c) in sequence, from the second telephone line, to the de-multiplexing means, an input high bandpass filtering means, a frequency multiplying means, for a low range left and right stereo portions to the local music monitor;

such that the remote and local stereo signals are merged for output to the local music monitor.

8. The apparatus of claim 8 further providing a means for signal level control so as to provide identical levels in the output and input signals.

9. The apparatus of claim 8 further providing a means for signal delay control so as to provide synchronization between the output and input signals.

10. An apparatus for music production by a local and at least one remotely located musician, the apparatus comprising:

a local music stereo signal having a left and a right channel stereo portions produced by a local music source and a remote music stereo signal having a left and a right channel stereo portions produced by a remote music source, the signals conducted for processing of the left and right channel portions of the stereo signal to a local music monitor:

- a) the local stereo signal being directed to a multiplexing means for transmitting a midrange frequency portion to a remote location using a first telephone line;
- e) in sequence, to an output low bandpass filtering means, a modulator and frequency shifting means and a frequency shifting means, the multiplexing means, and the first telephone line for transmitting a low frequency portion of the local music signal to the remote location; and
- f) in sequence, to an output high bandpass filtering means, a frequency dividing means, the multiplexing means and the first telephone line for transmitting a high frequency portion of the local music signal to the remote location;

a remote music stereo signal having a left and a right channel stereo portions produced by a remote music source and conducted for processing of left and right channel portions of the remote stereo signal:

- b) from a second telephone line, to a de-multiplexing means for receiving a midrange frequency portion of the remote music signal from the remote location and therefrom to the local music monitor;
- c) in sequence, from the second telephone line, to a de-multiplexing means, an input low bandpass filtering means, an input demodulating means, an input frequency shifting means for a low range portion to the local music monitor; and
- d) in sequence, from the second telephone line, to the de-multiplexing means, an input high bandpass filtering means, a frequency multiplying means, for a low range portion to the local music monitor;

such that the remote and local stereo signals are merged for output to the local music monitor.

11. The apparatus of claim 11 further providing a means for signal level control so as to provide identical levels in the output and input signals.

12. The apparatus of claim 11 further providing a means for signal delay control so as to provide synchronization between the output and input signals.

13. An apparatus for music production by a local and at least one remotely located musician, the apparatus comprising:

5 a local music stereo signal having a left and a right channel stereo portions produced by a local music source and a remote music stereo signal having a left and a right channel stereo portions produced by a remote music source, the signals conducted for processing of the left and right channel portions of the stereo signal to a local music monitor:

- 10 a) the local stereo signal being directed to a multiplexing means for transmitting a midrange frequency portion of the left channel portion of the stereo signal to a remote location using a first telephone line;
- b) in sequence, to an output low bandpass filtering means, a modulator and frequency shifting means and a frequency shifting means, the multiplexing means, and the first telephone line for transmitting a low frequency portion of the left channel of the stereo signal of the local music signal to the remote location; and
- 15 c) in sequence, to an output high bandpass filtering means, a frequency dividing means, the multiplexing means and the first telephone line for transmitting a high frequency portion of the left channel portion of the local music signal to the remote location;
- 20

a remote music stereo signal having a left and a right channel stereo portions produced by a remote music source and conducted for processing of left and right channel portions of the remote stereo signal:

- 25 d) from the first telephone line, to a de-multiplexing means for receiving a midrange frequency portion of the left channel portion of the remote music signal from the remote location and therefrom to the local music monitor;
- e) in sequence, from the first telephone line, to a de-multiplexing means, an input low bandpass filtering means, an input demodulating means, an input

frequency shifting means for a low range portion of the left channel portion to the local music monitor; and

- f) in sequence, from the first telephone line, to the de-multiplexing means, an input high bandpass filtering means, a frequency multiplying means, for a low range portion of the left channel portion to the local music monitor;

the local stereo signal being further directed:

- a) to the multiplexing means for transmitting a midrange frequency portion of the right channel portion of the stereo signal to a remote location using a second telephone line;
- b) in sequence, to the output low bandpass filtering means, the modulator and frequency shifting means and the frequency shifting means, the multiplexing means, and the second telephone line for transmitting a low frequency portion of the right channel of the stereo signal of the local music signal to the remote location; and
- c) in sequence, to the output high bandpass filtering means, the frequency dividing means, the multiplexing means and the first telephone line for transmitting the high frequency portion of the right channel portion of the local music signal to the remote location;

the remote stereo signal being further directed:

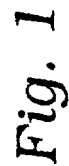
- a) from the second telephone line, to a de-multiplexing means for receiving a midrange frequency portion of the right channel portion of the remote music signal from the remote location and therefrom to the local music monitor;
- b) in sequence, from the second telephone line, to the de-multiplexing means, the input low bandpass filtering means, the input demodulating means, the input frequency shifting means for a low range portion of the right channel portion to the local music monitor; and
- c) in sequence, from the second telephone line, to the de-multiplexing means, the input high bandpass filtering means, the frequency multiplying means, for a low range portion of the right channel portion to the local music monitor;

such that the remote and local stereo signals are merged for output to the local music monitor.

- 5 14. The apparatus of claim 14 further providing a means for signal level control so as to provide identical levels in the output and input signals.
15. The apparatus of claim 14 further providing a means for signal delay control so as to provide synchronization between the output and input signals.
- 10 16. The apparatus of claim 14 wherein the output low bandpass filtering means is enabled for passing 20-300 Hertz, and the frequency shifting means is enabled for shifting the 20-300 Hertz to 2.25-3 kilo-Hertz.
17. The apparatus of claim 14 wherein the output high bandpass filtering means is enabled for passing 3-20 kilo-Hertz, and the frequency dividing means is enabled for dividing by 10.
- 15 18. The apparatus of claim 14 wherein the input low bandpass filtering means is enabled for passing 2.25-3 kilo-Hertz, and the frequency shifting means is enabled for shifting the 2.25-3 kilo-Hertz to 20-300 Hertz.
19. The apparatus of claim 14 wherein the input high bandpass filtering means is enabled for passing 300-2000 Hertz, and the frequency multiplying means is enabled for multiplying by 10.

ABSTRACT OF THE DISCLOSURE

An apparatus for music production by a local and at least one remotely located musician, the apparatus comprising: a local music signal produced by a local music source and conducted for processing: (a) to a local music monitor; (b) to a multiplexing means and a first telephone line for transmitting a midrange frequency portion of the local music signal to a remote location; (c) in sequence, to an output low bandpass filtering means; a modulator and frequency shifting means and frequency shifting means; the multiplexing means; and a first telephone line for transmitting a low frequency portion of the local music signal to a remote location; and (d) in sequence, to an output high bandpass filtering means, a frequency dividing means, the multiplexing means and the first telephone line for transmitting a high frequency portion of the local music signal to the remote location. The apparatus also includes. secondly a remote music signal produced by a remote music source and conducted for processing through the first telephone line and, further: (a) to the local music monitor for receiving a midrange portion of the remote music signal; (b) in sequence, to an input low bandpass filtering means; a demodulator and frequency shifting means; and a frequency shifting means; and thence to the local music monitor; and (c) in sequence, to an input high bandpass filtering means, a frequency multiplying means and thence to the local music monitor; such that the local music signal and the remote music signal are combined to form a combined music signal.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Declaration For Utility Patent Application And Power Of Attorney

As a below-named inventor, I hereby declare that my residence, post office address, and citizenship are as stated below next to my name and that I believe that I am an original, first, and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention, the specification of which is attached hereto and which has the title of:

"APPARATUS AND METHOD FOR MUSIC PRODUCTION BY AT LEAST TWO REMOTELY LOCATED MUSICIANS"

I have reviewed and understand the contents of the above-identified specification, including the claim(s). We acknowledge a duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby declare that all statements made herein are of my own knowledge and are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

As the named inventors, we hereby appoint Mr. Gene Scott, Registration No. 37,930, of the firm Patent Law & Venture Group, 3151 Airway Ave., Suite K-105, Costa Mesa, CA 92626 (phone 714/ 668-1900) to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith.

Please send all correspondence to the above address.

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PATENT TRADEMARK OFFICE

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Small Entity Declaration
Independent Inventors

First Applicant: Dennis L. Ford
Second Applicant: Michael R. Leggett
Third Applicant: Cindy Leggett-Ford

Title: APPARATUS AND METHOD FOR MUSIC PRODUCTION BY AT LEAST TWO REMOTELY LOCATED MUSICIANS

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35 United States Code, to the Patent and Trademark Office with regard to my above identified invention described in the specification filed herewith. I have not assigned, granted, conveyed, or licensed, and am under no obligation under any contract or law to assign, grant, convey, or license any rights in the invention to either (a) any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or (b) any concern which would not qualify as either (i) a small business concern under 37 CFR 1.9(d) or (ii) a nonprofit organization under 37 CFR 1.9(e).

I acknowledge a duty to file, in the above application for patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

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